

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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NEW SUBSTITUTE FOR SILVER.

METALLIC MAGNESIUM—NEW CHEMICAL ELEMENT.

Until within the last few years comparatively few were sanguine enough to hope that the metal aluminium was obtainable in such quantities and at such a price as would admit of its profitable application in the industrial arts, yet at the present time we have the opportunity of purchasing a great variety of articles in general use manufactured from an alloy in which aluminium is certainly the most important ingredient; the great recommendation of the alloy being that whilst the articles made of it so nearly resemble gold that it is almost impossible to detect the deception by simple inspection, the price at which they can be produced is no greater than that of ordinary Sheffield plated ware. It now seems probable that another hitherto unapplied metal will be turned to commercial account, and from the abundance in which the minerals capable of yielding it may be obtained, we may ere long have to record the introduction of magnesium as a substitute for silver at one-tenth the price of the standard metal as we have already had to mention the introduction of aluminium bronze as a substitute. At present, it is true, some obstacles are met with in obtaining the metal with facility, except from a single substance yielding it—Epsom salts,—but from the fact that the patentee of the process we are about to describe—Mr. Edward Sonstadt, of Loughborough—has given ample proof that it can be obtained, although less advantageously, from other sources, we do not despair of magnesium at no distant period becoming an ordinary commercial product.

The object of Mr. Sonstadt's invention, as he states, is to effect improvements in the manufacture of the metal magnesium. He first obtains pure magnesia by precipitating Epsom salts with soda or carbonate of soda. He allows the precipitate to subside, and decants off the water; he then washes the precipitate repeatedly in hot or boiling water, drying it between each washing. This is repeated, until the wash water gives no precipitate, with chloride of barium, acidulated with nitric acid. The pure magnesia is dissolved in hydrochloric acid, and solution of chloride of sodium is added. Or a suitable chloride of magnesium may be obtained from the mother liquors of sea water, which (after precipitation of sulphates by chloride of barium, of calcium, and of excess of barium, by just and only just sufficient carbonate of soda or of potash) furnishes at once a solution of chloride of magnesium, which may be used for the production of the metal. It would even be possible to carry the concentration of the mother liquors of sea water just to that point at which they would contain the chlorides of magnesium and of sodium in suitable proportion. The presence of chloride of potassium in the mother liquors is no disadvantage, nor is the presence of alkaline iodides and bromides injurious. He has found it, commercially, impracticable to separate the sulphates from commercial magnesia, as usually sold as a source of the metal. Commercial magnesia may be used by treating it with pure hydrochloric acid, and then precipitating the sulphuric acid with chloride of barium, decanting the liquor, and boiling upon bicarbonate of soda or potash sufficient to neutralise the acid in excess, and precipitate the barium.

The chloride of magnesia is treated with chloride of sodium, and after being evaporated to dryness by preference in a silver dish, the dried material is placed in a platinum crucible loosely covered, and heated to redness. When it enters into tranquil fusion the operation is complete, and the fused mass may be poured out on to a clean cold iron plate, or it may become cold in the crucible, when it will fall out on inverting and shaking the crucible. The substance thus formed he calls "material," being doubtful as to its precise chemical constitution. This "material" must be kept quite dry until used, or there is a great loss of magnesium in the subsequent process. If the "material" be permitted to cool in the crucible the mass will readily separate into two portions—the one white, and somewhat translucent; the other dark grey, and showing evidence of having been but imperfectly fused. When the magnesium is prepared from Epsom salts this dark portion is insignificant, but when from the magnesia of commerce it is considerable.

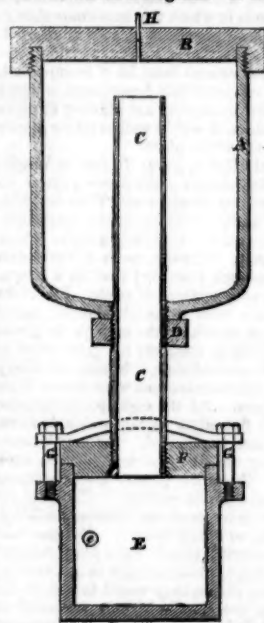
This dark matter is very similar to the dark matter obtained when chloride of magnesium is obtained by the method usually practised by chemists—by evaporating and igniting a mixture of the solutions of chlorides of magnesium and of ammonium; it contains, as Mr. Sonstadt finds, besides magnesia and intermixed chlorides, a peculiar substance, which is, so far as he is aware, yet unrecognised by chemists. It simulates iron in many of its reactions. Like iron its acid, peroxide, and perchloride solutions give a blue with solution of yellow prussiate of potash, but unlike iron this blue is unalterable, or only changes to purple on addition of ever so large an excess of ammonia. The lower oxide, or chloride solution, of the new element behaves also like iron, in giving a blue with red prussiate of potash, which blue, however, unlike that of iron, is unchanged by excess of ammonia. Other reactions of the new substance are exceedingly like those of iron; but when its precipitate by an alkali is ignited, it is reduced to a dark spongy mass before the blowpipe with great difficulty. This mass does not fuse, and is not in the least magnetic. Mr. Sonstadt finds magnesium to be always associated with this new element, which may be separated by distillation of the magnesium, but by no other method which he knows. For the present he calls the new element x, and he finds that when the magnesia is obtained as he directs the material is much freer from x and from sulphuric acid than when commercial magnesia is employed. In consequence of the presence of the x, the use of ammoniacal salts and of nitrogen, or its compounds, must be avoided.

Magnesium prepared by the preceding process has a silver-white colour, is very brilliant, malleable at a temperature below redness, but somewhat brittle at common temperatures; it fuses at a red heat, and at that temperature burns in the air, giving a brilliant white light. It is but little oxidisable at common temperatures even in the moist air, and is not sensibly affected by sulphuretted gases; it is acted upon by ammoniacal gases. It cannot easily be cast in air, as it is very viscous at a temperature but just above its fusing point, and at the temperature at which it flows readily it inevitably takes fire. It may, however, be fused in chloride of magnesium, upon the surface of which it floats, and then be drawn up into tubes by suction, and so obtained in ingots. It may also be fused into solid masses in iron vessels, from which the air is excluded by coal gas, or as is more convenient by dry hydrogen. If coal gas be employed, it should be freed from sulphuretted hydrogen, ammonia, air, and moisture. The specific gravity of magnesium is about 1.74. Dry hydrochloric acid gas may be passed over fused magnesium without the latter taking fire, and the metal if impure becomes purer by the process. The metal magnesium is suitable for use as a substitute for silver, and for other purposes.

Although at present the precise nature and properties of the new ele-

ment are not known, the discovery of it is not the less important, inasmuch as it not unfrequently happens that a substance commercially valueless of itself will impart very valuable properties to products with which it may be combined; or on the other hand, the knowledge of the existence of a previously unknown element may enable steps to be taken for its removal from products upon which it has exercised some prejudicial influence, which could not otherwise be accounted for.

In the specification of the patent above referred to, it will be seen that Mr. Sonstadt has described a process of manufacturing magnesium by decomposing with sodium the mixed chlorides of magnesium and of sodium. He has since found that in the preparation of this material chloride of potassium may be advantageously substituted for chloride of sodium. In order to purify metallic magnesium, he distils it in a peculiar apparatus, of which we annex a diagram. It consists of two vessels, connected together



by a pipe or passages. These vessels are both capable of being closed airtight, and during the process of distillation they are so closed. One of these vessels is placed in a furnace, and surrounded by the fuel there. In this vessel the magnesium is contained; the other vessel, which is immediately below it, is fitted into a recess formed for it in the fire grating or bars of the furnace, and it projects below. The crude magnesium having been placed in the upper vessel, and the apparatus closed, so that the joints shall be airtight, a current of dry hydrogen gas is passed through the two vessels, there being a small aperture left in each vessel for this purpose. When the whole of the air has been swept out, these apertures are closed by driving in steel plugs, but there is a small passage left in the plug of the lower vessel, so that when the apparatus is heated, and the gas expands, the excess may be able to escape; this passage can be closed with a wire, which is made to fit it nicely. The apparatus being charged and ready the fire is lighted around it, and the hydrogen as it escapes from the before-mentioned small passage or orifice is ignited, and allowed to burn as long as it will, and the passage, or orifice, is then closed by means of the wire. The lower vessel is during the process kept cool by mopping it externally with water. The vessel containing the magnesium should be heated to a very bright red, approaching a white heat, but not higher than the vessel can conveniently bear, and it is maintained at this heat for a sufficient time, which will be known by the lower vessel becoming cooler than it was at the commencement of the process, notwithstanding that the heat of the furnace is maintained. The operation being complete, the apparatus is withdrawn from the furnace, and cooled; it is then taken apart, and the magnesium will be found in a more or less solid mass in the lower vessel.

In the accompanying diagram, A is a wrought-iron crucible; B, cover to crucible screwed on; C, C, tube connecting crucible with condenser screwed into crucible; D, lock nut to fix tube C airtight; E, iron condenser with 1/2-inch hole, e, stopped with 1/2-inch removable plug; F, cap to same, screwed on to condenser; G, screws for same; H, pin removable, but driven in airtight.

DESCRIPTION OF IMPROVED MACHINERY FOR CRUSHING, GRINDING, AND AMALGAMATING QUARTZ, QUARTZ-TAILINGS, AND OTHER AURIFEROUS EARTH, COPPER AND SILVER ORE, &c.

We have received the following description and explanation of machinery registered for a patent, by Mr. Knobel, of Bendigo. That gentleman has entered rather elaborately into the matter, giving reasons that are deserving of some consideration for making trial of his invention. The improvements may be adopted in whole or only in part, and the amalgamatory process, &c., worked by horse-power, and adapted for passing through quartz-tailings, as well as sludge from puddling-machines:—

The above invention comprises five stampers, that may be either square, round, or octagonal. Square heads are preferable, a larger surface of the stamp-head being crushed upon than is the case with round heads. If turned occasionally, they will work their own as well as the bed's surface as even as the round heads. These stamps are not all the same size. There are two large ones that may be called the breakers, and three of a smaller size, the crushers. The crushing-box (stamp-box), is constructed wider at each end than at the centre, in consequence of the breakers being larger than the crushers. It has two mouths, made to receive a supply of material for the breakers to act upon; a separate supply of water is conveyed to the box by means of a pipe close to the box, and placed between the two mouths. The frame, with grating, extends only to the length of the three crushers—the large stampers to be without any front grating; the food for the breakers need not be smaller than about 5 to 6 inches. The half-crushed quartz from the breakers will travel, by force of the water and motion of the breaker, to beneath the crushers, to be there crushed small enough (say to the size of 1/2 inch), to pass through the grating. The latter may be coarse wire, being more durable than punched grating; from thence the pulverised ore will travel, by means of a shoot, direct to the grinding-mill, to be reduced to almost impalpable powder. If considered desirable, the coarse gold may be collected by providing the shoot with a ripple-box, close to the crushing-box.

The advantage gained by this principle scarcely needs explanation to those acquainted with quartz-crushing machinery; but for the inexperienced it may be mentioned that, in ordinary mills, the stamps-man feeding gives an equal supply of rough quartz to every stamp. After a few minutes, when the first feed has been half-digested—in other words, reduced to, say, half an inch in size, the attendant will again give, and is bound to give, each stamper another feed of quartz; consequently, the first lot,

crushed already smaller, will remain untouched by the stampers until the second lot is reduced to the same size; and so from beginning to end. This shows clearly, to say the least of it, that time must be lost at each interval. The inventor is, therefore, of opinion that the large quartz should be broken to a certain size by one stamper, and reduced smaller by another. Hence the introduction of a different construction of stamp-heads and crushing-box. The grating being coarser than usual, will, as a matter of course, cause the stamper to do more work. A larger quantity of quartz can, in the same time, be crushed down to an eighth of an inch; then from an eighth of an inch to the necessary fineness for extracting the gold. It must not be forgotten either, that it is impossible to keep the surface of the stamper-bed and the bottom of the crushing-box sufficiently even to crush the fine quartz as fine as it should be, to be discharged from the several stampers. This affords a proof that the tailings from the quartz are not pulverised by the actual weight and blow of the stamper, but by their (the tailings) own friction within the crushing-box. The inventor is not prepared to say how many rounds and turns, or how much time tailings in the crushing-box require before reaching the requisite fineness that should satisfy the quartz-miner; but Mr. Knobel avers, that when the quartz is reduced to the size of, say, the eighth of an inch, the stamps have done their work, and further pulverisation ought to be accomplished by other means. To effect this, Chilian mills, rolls, balls, &c., have been introduced, used, and put aside again. But it is doubtful whether that kind of mill, or any other that revolves on an axle, in a perpendicular way like a carriage-wheel, will answer the purpose; for the reason that, after all, they are only crushing machines, with this difference, that stampers act with their blow besides their weight, whilst Chilian wheels, &c., act only by their weight, and on a very few inches of surface. There is no grinding whatever. It follows, therefore, that it must be a very slow and insufficient process for pulverising quartz, the more so as that many small particles lumped together under a wheel will altogether resist a certain weight.

Taking this into consideration, it may be argued that, to reduce quartz to dust it should be subjected not only to the weight and blow of the stamper, but to friction also—i.e., to some sort of grinding process. It is proposed to provide for the latter by the addition of what are termed eccentric grinders.

Eccentric grinding mills, similar to those here introduced, are adapted for grinding glass metal at the glass manufactories in Austria and elsewhere. In the instances just enumerated, the cast-iron grinders are cast in one piece. This is very objectionable for many reasons—amongst others, on account of the difficulty of keeping open the curves on the face of the grinders, and also their not sufficiently admitting air between them. Here the grinders would be cast in segments, so that by joining them together, a small space would be left between each, for admission of air, and that would likewise form the curves on the face of the grinders. This could be better understood by inspecting the plan. The curves are to perform the work of cutting the ore, or any hard substance intended for grinding. The grinders, according to this principle, will work horizontally (similar to a pair of stones at a flour-mill), in a cast-iron basin, large enough in circumference for the moving grinder to work eccentric. The reason for working the grinders eccentric may here be mentioned. Supposing the grinder turns round its centre, the periphery of all distances from the centre of the moving grinders will always be travelling exactly over the same circles, causing hollows or elevations on the face of the grinders, thereby losing the proper grinding effect. The ore would thus be reduced coarse and fine, very irregularly, and in a short time grinding would require double the power. By working the grinders eccentric, this evil will be avoided, as every spot on the face of the grinders will change at every round, keeping their faces perfectly level. A counter-balance is to be placed on the top of the moving grinder to compensate for the weight that is lost, and given to the opposite side of the grinder through working eccentric. The hardest French burstone (used in flour-mills) does not answer as well as white cast-metal. The stone is seldom of equal hardness, and is besides not less costly than the other. The grinders may be worked wet or dry, with or without mercury, although wet working charged with a sufficient quantity of mercury is preferable. The tailings and water will be conveyed direct from the stamps to the grinders, the stuff entering at the centre of the latter. The mercury is to be put in and left in the basin until the amalgam is required to be taken out. A constant charge of mercury through the centre of the grinder might be adopted, but this is unnecessary, besides being unfavourable to the mercury. The motion of the grinder will keep the mercury in continual revolution with water and the ground ore, and a scraper fastened to the former will raise at every round any particles that may settle to the bottom of the outer periphery of the basin.

By means of a screw the moving grinder may be raised or lowered as often as necessary for starting and stopping the machinery, as well as for adjusting the grinders when the grinding is required to be changed from coarse to fine, or vice versa. The great advantage gained by the eccentric horizontal working grinders, with axles working perpendicularly over grinding balls, and all Chilian or other mills that work on horizontal axes, after the manner of carriage wheels, must be self-evident. Mention, however, may be made more particularly of the grinding effect. For example, Chilian mills, balls, &c., receive the fine quartz direct under their axle, and crush (not grind) with their weight only; the quartz on the flat or curved surface of basin presenting to the entire width of the wheel (say 18 in.), but only one or two inches in width (proportionate to the diameter of the wheel or ball) along the course the wheel or ball travels. It is evident the wheel cannot crush each and corn, so large a quantity being under the wheel at the same time. The most of the stuff will, therefore, escape untouched, and be at rest, or else worked about in the basin until caught again by the travelling-wheel, or the one travelling in the same course, or by those that travel parallel with the former. In the case of the eccentric horizontal working grinders the crushed quartz is pushed in such a way that it cannot escape being ground at once, and not re-crushed, as by the wheels, &c. The stuff to be treated entering the grinders at their centre, and the centrifugal power working the ore from the centre to the periphery of the grinders, each sand-corn is subjected to the friction caused by the motion, that there is no possibility of it avoiding being reduced to dust before leaving the mill. This sufficiently explains why the eccentric grinders should be specially adapted not only for pulverising quartz and other substances completely; but why they should also prove good amalgamators at the same time; in fact, I would not suggest another amalgamator if it were not for the velocity required for effectual grinding, and that might cause the gold to be splashed out of the basin, notwithstanding all care. For the purpose of lifting the grinder out of the basin to remove the amalgam a crane is to be fixed near the mill in such a manner that one man may be able to

manage it with ease in a few minutes. It is unnecessary here to explain in detail the several parts of the gearing and the erection of the machinery, &c., as the plan will afford sufficient information to any persons desirous of making a trial of the improvements above described. For purposes of amalgamation, Mr. Knobel has introduced what he has designated the cylindrical amalgamator.

Amalgamators of cylindrical form, but of various constructions, have from time to time been introduced, all attempting amalgamation much in the same way—viz., leaving the contact of the mercury with the gold very much to chance. The gold once out of reach of the mercury must be lost. The gold and tailings, or earthy matter, together with the mercury, should rise and fall by the motion of the cylinder. This process should not terminate after one, or even a few, rounds, but be repeated in several chambers in the same cylinder, by the same action, and without any extra trouble, so that the gold escaping the process in the first chamber, or division, should be collected in the second or third, and so on. The plan here proposed is calculated to effect the object just stated, by subjecting the gold repeatedly to collection. It comprises four divisions, a sufficient number for five stampers and one pair of grinders. The shaft, or axle of the cylinder, works horizontally by gearing, (say) 12 revolutions a minute, the water and ground stuff from the mill travelling through a shoot direct into the first division of the cylinder, all the divisions being charged with mercury. The sand, water, and mercury will be kept in continual motion, and will rise and fall by means of raisers secured internally to the shell, eight times at each turn of the cylinder. The supply of water, &c., from the grinders will thus, after several revolutions, wash the contents through each division in succession, so that the same process will be repeated as many times as there are divisions in number. The amalgam will be taken out of each division separately by means of doors.

The supply of water to the stamps ought to be carefully regulated, to prevent an overflow that might occasion a loss of fine gold. Overflows cannot be avoided at all times; they will happen when starting or stopping the machinery, perhaps, 20 times a day. To collect gold, scarcely to be perceived by the naked eye, from being lost by an overflow of the cylinder, another trifling, but not less important, apparatus is suggested, called the "copper snake."

Under the end of the Cylindrical Amalgamator is to be fastened an iron receiving box (square funnel) to receive the contents (sand and water) from the cylinder. To this is to be attached the snake, constructed of two sheets of copper, about 2 ft. broad, bent in the form of a snake, and bolted edgewise into a wooden or iron frame. The copper plates should not be more than 1 in. apart. The mouth of the snake receives the water, sand, and gold (if any) through the funnel from the cylinder, and the discharge is effected at the end of the snake. Any gold remaining in the tailings discharged from the amalgamator would adhere to the copper plates, the atmospheric pressure forcing the contents of the snake to all its sides and bends, no other way being left for the water, &c., to escape than at the snake's end.

The copper snake may be unscrewed, for the purpose of removing the amalgam, or may be replaced at any time by a reserve snake.

The continual motion of the mercury in the basin of the mill, as well as in the cylinder, will prevent the powdered mud from settling in the form of a blackish scum over the surface of the mercury, as is frequently the case with stationary tables and ripple boxes.

As, at the present time, crushing machinery is solely used for the extraction of gold, it is not the intention here to enter into any description of the reduction or amalgamation of silver, copper ore, or other minerals and substances.

The advantage proposed to be gained by the improvements already referred to may be thus summed up:—The machinery, as specified, may be thus adapted as a complete plant for reduction of quartz, &c. One mill, by constructing the grinders of a larger diameter, will be sufficient for two batteries of five stamps, but if not enough or too much work for the grinders, the supply may be regulated by applying coarser or finer grating for the stamps. One amalgamator will be sufficient for ten or more stampers, and for one or more mills, provided that the cylinder be increased in length—that is to say, by increasing the number of the divisions. The diameter and length of each division are unimportant. Owners of crushing-machines may work their present batteries, and adapt the mill and amalgamator only. For the purpose of reducing and amalgamating quartz tailings the grinders and amalgamators are alone necessary.

The machinery is simple in construction and easily worked, and the cost price moderate in proportion to the improvement, and the increase in quantity of crushing and saving of gold. The basin of the mill may be made of timber, or of cast or wrought-iron; the amalgamator likewise of cast or wrought-iron, or timber, or partly of timber and partly of iron.

The quantity of water needed would not be more than for an ordinary crushing-machine. An 8-horse power steam-engine would work with ease five stampers, grinding-mill, and amalgamator.

—*Dick's Mining Record (Melbourne).*

TREATMENT OF GOLD ORES—NEW PROCESSES.

[From an article in the "United States Railroad and Mining Register" entitled "Notes of a Trip to the Colorado Gold Region,"]

The veins are made up of iron pyrites, irregularly disseminated through quartz, no gold being visible, except in occasional instances, at the surface when, through electro-chemical agencies the sulphides have undergone decomposition, coating the quartz with some sesqui-oxide of iron, and bearing small nuggets, grain or filaments of the native gold exposed. At a depth of from 100 to 150 ft. the quartz becomes more separated from the iron pyrites, and a large proportion of it is segregated along the wall-rocks in the form of well-defined crystals, the iron pyrites becoming more replaced by copper pyrites, and in some instances by galena or sulphide of lead. These are considered most favourable indications, and the "iron" (by which name all the vein stuff is called among the miners) is said to become richer in depth. We believe there is no known instance in the whole region where a vein has impoverished in depth, except it has been by capping over, and we have seen above that, wherever this has been worked through, the vein stuff is found of sufficient richness. The galena occurring in the veins is also highly argentiferous—the amount of silver reaching, in some instances, as high as \$40 to the ton of ore.

The vein stuff is crushed in stamp mills, the stamps of which are usually of the description known as the "Dater Patent." The weight of the heads are, on an average, about 450 lbs., and have, besides the usual vertical motion, a small amount of rotary motion. The mills contain usually 12 or 16 heads of such stamps, arranged in batteries of 4 heads each, and are worked, in some instances, by water-power, but in the majority of cases by steam. The ore is stamped with mercury and water, and the gold is saved in the passage of the amalgam through sieves and over amalgamated plates and blankets. But the presence of such a large amount of sulphurous matter interferes with the saving of all the valuable metal, and hence we find an amount of gold ranging from 85 to 90 per cent. escaping in the tailings. When it is considered that the yield of the veins, as shown by direct chemical assay, amounts, in some instances, to as much as \$2000 per ton, and ranges between that amount and some few hundreds per cord, the vast amount of loss by this process of treatment can be fully appreciated. To counteract this so far as possible, experiments are now being made with a view to the desulphurization of the ores, and several important patents have been secured for that purpose. Of these apparatus three, more especially, deserve our attention, and though the results arrived at have been only in experimentation, and the machinery is not in very general use, they have given indications that they will prove to be important adjuncts in the development of the country.

In "Keith's Desulphurizer" the ore is crushed in a centrifugal mill, by which the coarser pieces are returned for re-treatment, and the finer particles are driven forward through a short pipe into a fire-chamber. Here they meet with the flames and heated gases from a wood fire, and the sulphur and most of the metals undergo combustion and oxidation. Thence they pass through a fine of some 2 ft. in diameter and 20 ft. length into a series of chambers, where they are deposited, and when they are raked out and treated on a small percussion table of peculiar construction, and, subsequently, in an astra, with mercury. About three cords of wood are consumed every 24 hours by the engine and in the combustion chamber; the whole process requires the attention of four men; will treat one cord of ore per day at a cost of about \$30, and, it is claimed, will save about 75 per cent. of the gold therein contained.

The "Byerson Amalgamator" consists of an upright cylinder of boiler iron, with a height of some 5 ft., and a diameter of about 20 in., provided with an opening in the top for the purpose of introducing the ore, and with another in the bottom, through which the contents are discharged after amalgamation. Inside the cylinder are a set of arms, which are made rapidly to revolve whilst the apparatus is in use. Superheated steam is thrown into the lower end of the cylindrical vessel, the escape of which, in connection with the revolving arms, keeps the finely divided ore, previously admixed with quicksilver, in agitation. As the mercury is rapidly volatilized by the heat of the steam, a contrivance is so arranged as to keep the head of the cylinder so cool that that metal will be condensed and again fall into the mass being treated. The steam reacts on the sulphur of the ore, generating acids which assist in the process of freeing the gold from its associated metals, and rendering it bright and in condition to be at once seized upon by the quicksilver. The apparatus is claimed to be capable of treating 500 lbs. of crushed ore every half hour, and requires the attention of three workmen. We had no means of getting at the cost of the process, nor of the practical results obtained by it, since the apparatus had just been erected, and the superintendent was not inclined to communicate on its performance.

Another amalgamator, erected by a Mr. Humphreys, and in operation at the Hollman Mill as well as elsewhere, and designed principally for the treatment of tailings, consists of an astra with perpendicular sides and a bottom piece of cast-iron, under which is a steam-chamber. In this contrivance a series of some 16 iron-shod mullers are made to move by attachment to heavy cast-iron arms, the whole having a weight of about 1200 lbs. The thorough incorporation of the mercury with the crushed ore, brought about by the mullers, and the treating through steam, effects a rapid amalgamation of the gold, which is further assisted by the desulphurization of the vein stuff by the introduction of chemicals. It is claimed to be of economical action, is of small cost at the

test, and is said to clean the ore up within 10 per cent. of the whole amount of gold contained in them.

These, in general terms, are the processes employed throughout the region in the treatment of the highly pyritic vein stuff, and from them it may be seen under what difficulties the country has laboured in its development. It has been estimated that the whole amount of the capital brought into the region has not exceeded \$1,000,000 whilst the value of the product of last year was about \$9,000,000. This year, by the introduction of new and improved machinery (such as we have indicated above), a very handsome increase will be shown.

Three mills alone, the Black Hawk, Tiger, and Eagle, are producing, in the aggregate, nearly 10000 per diem, as will be seen from the following account of the operations for the four weeks ending April 25, 1863, taken from the books of the proprietors:—\$5538, \$5229, \$4639, and \$5580; total value of the product of three mills for four weeks, \$21,066. This can and will be largely increased by the continued operation of the desulphurizer (Keith's), which had been erected here as an experiment, but which has been suspended for repairs. This is but one firm's contribution to the yield of the whole district. With the wonderful yield given for the veins in view, it may justly be asked why every adventurer has not been successful in his operations? It is true that but a very few individuals who have entered upon mining enterprises here have attained profitable and noteworthy results, whilst the majority have absolutely become impoverished. The cause is to be summed up in "want of capital." But few lodes have been profitable from the surface; most of them, in the course of their exploitation, have required the passage through the wall or cap rock—always expensive—and to meet the outlay of which few have been provided with sufficient capital. Money must be borrowed, and ruinous rates of interest, or rather of usury (the rate paid has been as high as 30 per cent. per month) were required for it. Few had, at first, the perseverance, hardihood, and confidence requisite to push operations to such an extent in the face of so many obstacles. From the proceeds of the mine the vein was to be fully opened, and expensive machinery purchased, transported at the rate of over 6 cents per pound, and erected. In the whole history of mining the examples of successful culmination of enterprises on a small capital are exceedingly rare. Why should the Colorado miners prove exceptional? *Central City, April 25, 1863.* C. P. W.

MONEY MAKING—No. VI.

We have now arrived at that stage in the process of money making which is at once the most important and the most interesting—the stamping of the planchets. This is, as it were, the crowning operation of the whole of the processes performed at the Mint. The automaton weighing-machines, with their delicately poised beams, their miniature wheels, levers, forceps, glass counterpoise weights, distributing tubes, and numerous other minute mechanical details, are undoubtedly beautiful, as their action is almost infallible, but they yield the palm of interest, in one respect at least, to the coining-press. The weighing-machines exercise judicial functions. Like the Civil Service Commissioners, they may be said to test, and report upon, the qualifications of candidates for public service. It is the coining-presses of the Mint, however, which confer certificates upon the approved candidates from the weighing-room council chamber, and give them the stamp of approval. Vain, indeed, would be all previous manipulations of the precious metal without the impressed mark—"the image and superscription" of the coining press. The rapid transformation of "blanks" into coveted prizes, by covering their surfaces and edges with finely engraved devices—this it is which usually excites the admiration of those who witness in all its varied ramifications the art of money making.

With as much clearness as letter-press, without diagrams will allow, it shall now be attempted to explain the mode in which this important change in the complexion and value of the assized planchets of gold is effected. The four journey weights of annealed and dried out pieces to which reference was made in the last chapter are advanced then, let it be supposed, to the coining-press room. Whilst the officer of this department is again carefully weighing them in bulk, and the mechanics are affixing the dies and adjusting the presses for stamping them, it will be well to take a glance at the mechanical and other arrangements of the place.

The coining-press room at the Royal Mint is about 70 feet in length, 30 ft. in width, and 18 ft. in height. It contains eight power-presses on the vertical screw principle, as constructed by Boulton and Watt in 1810, and they are arranged in a straight line along the centre of the apartment. Of late years these presses have been almost in constant daily action. There is, in addition to them, a small hand-press, originally made in Paris, and which is used only on one or two days in each year, and that for a special purpose—the coining of the Queen's Maundy pennies, of silver. The eight power-presses, until the extreme pressure upon the establishment caused by the creation of the new bronze coinage, struck all the moneys for Great Britain and most of her colonies. In order to complete the great work of re-casting the copper currency in a short space of time, it became necessary to enlist also the presses of contractors; those contractors were James Watt and Company, of Soho, near Birmingham. At the eight power-presses, too, it may be stated the majority of the fine silver medals which decorate the breasts of our brave soldiers and sailors were struck. As may be imagined, the Mint coining-presses are very massive castings in iron, each press, indeed, weighing nearly 2 tons. By far the greater portion of these masses of metal are thrown into the bases of the castings. They are all firmly bolted to foundations of granite of great depth and immense solidity, and there is ample reason for their being so firmly bedded. Millions and millions of heavy blows are being constantly struck upon these coiners' anvils, and it is certain that if they were not of great strength in themselves, and well sustained in their stone resting places, they would fall under the ordeal. At a height of 2 ft. 6 in. from the floor, which is composed of thick and narrow oaken planking, so closely jointed and so carefully tongued with hoop-iron as to prevent the thinnest coin finding a crevice in which to hide itself—at the height named, a platform covered with diamond-pattern iron plates, with ample room around it for truck traffic, surrounds the coining-presses. From this platform, which is composed of stone and brickwork, set in Roman cement, spring at equal and convenient distances 18 stout square oaken columns, reaching to the iron girders of an upper floor, and bolted together laterally by hollow cross-bars of cast-iron, through which pass tension-rods of wrought-iron. The cross-bars serve a double purpose—they unite the columns between each press, in pairs, and support regulating buffers of wood and leather, which again limit the travel of the fly-arms, and sustain the shocks which arise from false blows of the presses. Taking, now, one of the presses as an illustration of the whole—and they are all alike—it may be stated that a coarsely pitched, treble-threaded, wrought-iron screw, 6 inches in diameter and 2 feet 9 inches long, passes through a deep gun-metal bush or nut, down the centre of the press. The lower end or "nose" of the screw is fitted with a plug of hardened steel, and stands about 1 foot above the planned upper surface of the bed of the press. Within the space between the nose of the screw or press-pin and the surface just indicated, the upper and lower die-holders are fixed, and within this space, therefore, all the money produced by the press is struck. There are steadying brasses, with adjusting or set-screws, for keeping the press-pin vertical. To the lower part of the press-pin, and so arranged that its internal disc or plug of hardened steel may face up to and come in contact with the steel plug of the press-pin, is affixed the upper die-holder. This is supported by two chariot rods passing through the body of the press, one on either side the press-pin, and fastened to a collar working on the neck of the same. The die-holder is further guided and steadied by steel pins sliding over angular edges of the press. It is clear, therefore, that with any upward or downward movement of the main screw the die-holder, with its die, must rise or fall with it.

Firmly screwed down to the perfectly level bed of the press is the lower die-holder. This is recessed for the admission of the lower die, and is supplied with three set screws for fixing the die accurately and firmly in its place; the upper die-holder is similarly recessed and fitted with screws. The die once set in this latter is, however, not adjustable. It moves up or down in a directly vertical line with the press-pin, and the lower die must be made to stand immediately and fairly beneath it. To the left side of the press is attached the feeding apparatus, or "layer-on," as it is technically named. It consists of a flattened pair of steel plyers, working beneath a tube constructed for the reception of planchets. Motion is communicated to the plyers by means of a flattened rod of steel about 3 ft. in length, and the upper end of which works in the slot of an eccentric quadrant attached to the press-pin. A pin passing through the centre of the rod forms the fulcrum on which it moves. Of course the feeding tubes, which are each 3 in. in height, vary in diameter with the size of the planchets to be operated upon. The plyers which clasp a single planchet from below each tube, and when in action carry it forward and deposit it on the face of the lower die, also vary, and from a similar cause.

It may now be supposed that a sovereign reverse die is placed securely in the upper die-holder, and with its face downwards. In the lower die-holder is fixed a sovereign obverse die, with its face upwards. It will be easily understood from this arrangement that if a gold planchet be placed on the lower die, and the upper die be brought forcibly down upon the planchet, that it will receive its two impressions—head and tail—at one blow. Before proceeding to describe more exactly this finishing stroke of the coiner's art, let us ascertain by what arrangements continuous and rapid movement will presently be given to the press. In order to do so we must mount the platform, and look around us. The golden planchets are distributed in trays among the boys, who are patiently seated in recesses in the platform, just in front of the presses, and purposely formed for their accommodation. The youthful coiners must restrain their ardour

a little longer, although the work they are to be engaged upon is "piece work," and is so paid for.

The main screw of the press, of which it has been necessary to speak so repeatedly, and which is the very backbone of the machine—the screw projects above the main body of the press, and fitted upon its conically-turned upper end are a pair of heavy fly-arms of cast-iron. These are of about 3 feet radius, and have secured to their extremities hollow boxes of cast-iron for the reception of weights. The boxes are flat-ended, and when the presses are in motion touch gently at each vibration the buffers before-named. The buffers serve to catch and sustain the weight of the press, should the attendant boy fail to feed his tube duly with planchets. From the centre of the fly-arms, and resting on them, rises a trumpet-shaped hollow shaft, with its broad end downward. This is the medium for the transmission of power and motion to the press. The mouth-piece of the trumpet is on the floor above, and thither let us go. Lo! here are pumps, rods, levers, lines, counterpoises, and, indeed, what used to be termed the secret machinery of the Mint. We are behind the scenes evidently, and shall endeavour to record our experiences and observations next week.

Erratum.—In Article VI., on Money Making, inserted in last week's Journal, for "never remain an unrevealed mystery," read "ever remain," &c.

FOREIGN MINING AND METALLURGY.

The situation of the Belgian Iron Market has been scarcely modified, and the trade recovers with difficulty from the languor under which it has been for some time labouring. A slight amelioration is, nevertheless, noted in pig, the price of which has been a little better sustained, at 32. 25. to 32. 45. for refining, and 32. 12s. to 32. 14s. for casting, with a margin of 2s. to 4s. per ton between the numbers. Rolled irons have remained quiet

at 62. 4s. to 62. 16s., and 72. 8s. to 72. 10s. for Nos. 1 to 4; plates, 102. to 102. 16s., according to thickness; white girders are quoted at 62. 16s. to 72. 4s. per ton. Rails are quoted nominally at 62. 4s. per ton, and it is announced that a contract for 6000 tons is in a fair way of being concluded on Italian account. The system of great production now practised in some works in the neighbourhood of Charleroi has just been applied to one of the Ongrée blast-furnaces, which now turns out daily upwards of 40 tons of pig. The Bonne Esperance Colliery, carrying on business at Montigny-sur-Sambre, near Charleroi, contrary to the usual course of procedure on the part of Belgian mining or metallurgical establishments, makes its proceedings public monthly; and it appears that in May 1863 tons of coal, the extraction of which cost 23841., were raised. The working expenses were increased by general and transport charges, commission, &c., to 27521., and the outlay incurred during the month in respect to preparatory works, buildings, &c., was 3061., making the total expenditure 30582. On the other hand, the coal sold realised 37021., leaving a net profit of 6441. for the month. From Jan. 1 to May 31, 1863, the total profits realised amounted to 62911. It was stated recently under this head that the dividend declared by the Thy-le-Château Blast-furnaces and Forges Company, in respect of the exercise of 1862, was at the rate of 17½ per cent. per annum, and it appeared that this dividend is now in course of payment—15 per cent. in new shares and 2½ per cent. in money. The shareholders in the Montigny-sur-Sambre Blast-furnaces and Rolling Works Company are convened in ordinary and extraordinary general meetings for Friday, July 10, to receive the accounts of the exercise 1862-3, and to decide on modifications suggested in the statutes, and a proposition to increase the available capital of the company, either by a loan or by an issue of new shares. The Ongrée Blast-furnaces and Collieries Company is also increasing its capital by an issue of 2000 obligations, of 200. each, bearing interest at the rate of 6 per cent. per annum. The Nord de Charleroi Collieries Company is now paying a dividend at the rate of 5 per cent. per annum. By a Royal Decree, dated June 8, 1863, the new statutes of the Longuerre Ferrand Colliery Company are approved. This company has issued obligations to the value of 1,000,000 francs, and it is provided that these obligations should be replaced in a less time than could be realised by the profits actually effected. The directors have just adopted a new mode for the repayment of these loans by converting the obligations into preference shares, yielding 11 annual interest, and repayable by annual drawings at the rate of 250. each, their nominal value being 200. each. The administration of the company is sinking a new pit, which will be completed, it is expected, in August; the products obtained will be suited to the fabrication of coke, and the production of gas for lighting purposes. A letter from Longwy, in the Moselle district, states that the demand for iron in that group continues good, and that all the works have orders, which will occupy them for some time, for merchants and construction irons. Notwithstanding, however, this relatively favourable state of things, and notwithstanding the wants which the orders received daily denote, no rise can be established in prices. The course of warrants follow the course of irons—the more iron falls off the less value has a warrant, and in consequence the more easy is it to secure the entrance of foreign irons. The writer adds—"As we live in an eminently speculative age, it was necessary to give metallurgy an element of speculation, and the warrant was accordingly invented. Unfortunately, it does more harm than good, and to benefit three or four great makers all the other forgers are injured." The works producing rails in the Moselle group preserve an apparent activity, carrying on operations in anticipation of the future wants of companies. It is proposed to erect metallurgical works in the neighbourhood of Gercy; a French company is on the eve of commencing the construction of blast-furnaces here. At St. Dizier, the situation of the market has been a little more favourable, a few passable orders having been received, which are to be executed within a limited period. This condition is almost always imposed by purchasers, who not having great confidence in the future, and knowing that the works are far from over-supplied with contracts, order in proportion to their wants. During the last few days the orders forwarded have had rather more importance. The forgers have generally little in stock, as their owners have preferred to reduce the fabrications from the English side, arrived when low waters exert their influence, notwithstanding recent rains. Under these circumstances, some ironmasters think that the time has arrived for raising the hitherto very low prices of wood-produced iron. Thus the proprietor of a rolling-works at Rognon writes that his prices are 91. 8s. for the greater part of his sales, or 91. 4s. as a "price of favour," with a difference of 8s. between classes. The proprietors of the Roche-ecourt-sur-Marne forges also announce that in consequence of their speciality of fabrication they are now prepared to sell as follows their irons obtained from pure wood-made pig: 91. 12s. per ton for first-class merchants' iron, with a margin of 6s. per class; and for first-class sheets, with a bonification of 4s. per ton when the order is for a large delivery at the Cheville station. Machine No. 30, has fallen from 101. to 91. 16s. per ton; merchants' bars have, however, been rather firmer, and have not changed hands for less than 101. 12s. per ton.

In the Paris Copper Market there have been comparatively few transactions; nevertheless, late rates have been maintained. At Havre, Chilean is quoted nominally at 86½; the rolling works do not appear to have strong stocks, but, on the other hand, their consumption tends rather to slacken. The arrivals from Chili in May were 13,093 bars, and the stock at the end of the month amounted to 1100 tons. In copper obtained from Lake Superior sources of supply there have been only few transactions; on the 1st inst. the stock was 404½ tons. The Antwerp market has continued quiet, but in the German markets a slight tendency to an advance has appeared in consequence of the encouragement given by the English side. At Berlin, Cologne, and Stettin previous rates have been maintained with more firmness. At Hamburg the market has remained quiet, with only a few transactions. As regards tin, the Dutch market is more quiet, and Banca has been dealt in at 79½ to 80½; the rise in this article has been checked by the announcement of considerable arrivals, which have enabled the greater part of the 20,000 ingots reserved by the Society of Commerce to be added to the public sale, which thus comprises about 120,000 ingots. This total is, however, considerably below that of former years, and the opinion is generally established that sales will not be effected at a rate below 79½ on the average. The prices involved by the recent rise have been generally sustained. Banca stands at 140½, and Detroit 136½; English has, however, been less firm, at 134½. Berlin, Cologne, and Stettin have been very firm, consumers readily paying the full prices quoted. At Hamburg, under the influence of later advice from Holland, the article has been slightly rising. At Paris the sales effected of late have been only small, and prices have presented no variation; rough French has been quoted 221., and Spanish 221. 4s. Stobberg has fallen slightly at Rotterdam; the last quotation was 113½ francs. Cologne has been quiet, and Berlin firm. At Hamburg the demand for export is pretty well sustained, and prices have been firm. Zinc is much neglected, and transactions are comparatively orders forwarded have had rather more importance. The forgers have generally little in stock, as their owners have preferred to reduce the fabrications from the English side, arrived when low waters exert their influence, notwithstanding recent rains. Under these circumstances, some ironmasters think that the time has arrived for raising the hitherto very low prices of wood-produced iron. Thus the proprietor of a rolling-works at Rognon writes that his prices are 91. 8s. for the greater part of his sales, or 91. 4s. as a "price of favour," with a difference of 8s. between classes. The proprietors of the Roche-ecourt-sur-Marne forges also announce that in consequence of their speciality of fabrication they are now prepared to sell as follows their irons obtained from pure wood-made pig: 91. 12s. per ton for first-class merchants' iron, with a margin of 6s. per class; and for first-class sheets, with a bonification of 4s. per ton when the order is for a large delivery at the Cheville station. Machine No. 30, has fallen from 101. to 91. 16s. per ton; merchants' bars have, however, been rather firmer, and have not changed hands for less than 101. 12s. per ton.

We may return to the interesting subject of the Mineral Wealth of France, resuming it with reference to the department of the Arige. As regards copper, remains of considerable works, the origin of which is referred by tradition to the Romans, are found on the eastern slope of the valley traversed by the rivulet of the Pésages, in the commune of Labourt. This bearing was in working in the second half of the last century. Many indications of copper minerals may still be noticed in subterranean works and cuttings, operations having been carried on upon several veins. The mine of the Fontaine d'Aubac has a fine vein, 4 ft. 4 in. in thickness, presenting pyritic copper, disseminated in a gangue of calcareous spath; it is encased in a black schist, and is directed from south-south-east to north-north-west, and it is to be desired that the bearing should be the object of new researches. The Escanorades Mine is situated in the mountain of that name, between the rivers Arce and Garbet, and has a vein 18 in. to 20 in. thick, directed from east to west, and plunging to the south at an inclination of 70°. The mineral is a coppery pyrite, very rich in gold and silver. According to Dietrich, an experiment made at the Mint of Paris, in 1775, proved that the copper extracted from this vein contained 0.0413 per cent. of silver, and 0.0125 per cent. of gold. The Combe Mine is situated in the Mountain of Ichedet, on the River Escorze, near Jorady, at a distance of 8½ miles, in a straight line from St. Lizer d'Ustou. This bearing, directed from east to west, comprises two veins, one of which inclines to the south and the other to the north. They are encased in an argillaceous schist, and one is 18 in. and the other 80 in. thick. The mineral is composed of copper pyrites, disseminated in a gangue of quartz and carbonate of lime. The solidity of the enclosing rock, and the proximity of wood and motive water-power would assure to this mine all the chances of an advantageous working, if the veins extend into the mountain with the same conditions as at the extremities. The Escalotates Mine is situated in the commune of Seix, on the right bank of the Salat; the vein is 28 in. thick, and is directed from south-south-east to north-north-west, going downwards to the south-west. The mineral is composed of copper pyrites and carbonated copper, disseminated in a gangue of carbonate of lime. At some depth the vein divides itself into two branches, one of which contains galena. A resumption of the works, which were abandoned at the close of last century, would, it is contended, present chances of success. The Sabouette Mine is situated in the commune of Seix, on the left bank of the Salat, in front of the Mine of Escalotates. This mine, when worked in 1756, produced fine minerals, composed of pyritic copper and carbonated copper, associated with quartz and hydrated iron. A foundry had been established near Seix for the treatment of these minerals, but, from the want of skill on the part of those who carried it on soon involved the ruin of an enterprise which appeared at the outset to present many chances of success. The village of Oust, situated a little below Seix, is a point of meeting for a great number of valleys, in which bearings of copper, lead, zinc, and silver abound; in fact, the district is one of the most favourably situated spots in Europe for becoming the centre of a considerable metallurgical industry. The mine of Made and Aunac, which are situated in the valley of the Sa at, in the commune of Seix, furnish copper pyrites; and the veins were worked, towards the middle of the last century, by the concessionaire of all the mines of the Couserans. The mineral extracted was carried to St. Gaudens, and was there sold at the rate of 12 French livres per metric quintal. The Forêt Mine was situated in the Minier Mountain, 1½ miles from the village of Forêt, in the Valley of Balagnon. This bearing, which is worked towards the middle of the sixteenth century, furnished, as refuse still indicates, pyritic copper and

blue and green carbonated copper. The traditions of the district lead one to infer that the minerals worked were auriferous, but the evidence on this point can scarcely be accepted as conclusive. The last works appear to have been executed so long since as 1580. Among miscellaneous copper bearings and mineral indications may be mentioned those of Lorient, in the valley of the Lorient, an affluent of the Arrière; at Caumont, in the valley of the Marnon, another affluent of the Arrière; at the Souire farm, near the Bastide-de-Sérin; in the mountain of Laquerie, in the commune of Méras; in the Rues on the River Arce; in the canton named Enfer (two veins); in the Puch-de-Gouat, near the River Arce and the mountain of the Pic-Rouge, in the commune of Aulus; at Puy-de-Lanès, in the mountain of Puch-de-Gouat, in the commune of Aulus; in the Jalmes, near the Frécherie, a rivulet of Puy; at the Bastide-Montal; in the valley of Foillat, at the point where the rivulet forms a cascade, &c. Thus much for the copper minerals of the Arrière; on a future occasion we will allude to its lead and silver wealth.

Meetings of Public Companies.

WEST CARADON MINING COMPANY.

A general meeting of proprietors was held at the company's offices, Broad-street-buildings, on Wednesday, Mr. J. HARRIS in the chair. Mr. DUNFORD (the secretary) having read the notice convening the meeting, the minutes of the last were read and confirmed. A statement of accounts for Jan. and Feb. was submitted, which showed—

Mine cost	£2552 18 3
Merchants' bills	944 6 7
Dues	190 11 5 = £3387 16 8
Copper ore sold	£2978 9 8
Carriage paid	109 9 4
Materials sold	2 4 8 = 3089 3 8
Leaving credit balance	£298 13 0

The report of the agents was read, as follows:—

June 23.—The following is our report of this mine, and I am sorry to say we are not in a position to give you a better report than at the last meeting—I mean from the value of our various operations; although, from the driving of our cross-cuts, we are getting near the objects we set out for, but in consequence of the continuation of the low standard, and the want of discoveries, our tributes are leaving, consequently our samplings must decrease. The 155, on Menadue lode, is looking better, and will produce 2½ tons per fm. The winze mentioned in our last report for the meeting is now down 10 fms., and has produced about 1½ ton per fm. We have now commenced to drive east and west with a full pair of men in each end, with a view to prove it as fast as possible, so as to enable us to lay before you the property of sinking our pump-shaft, or otherwise, after the Coma engine is put to work. We are still driving the 155, on Allen's, or the main lode, which presents a good appearance, and induces us to entertain the same opinion as formerly expressed. The 116 fm. level, on Dunstan's lode, will produce 1 ton per fm. We began a winze, as mentioned in our last, but in consequence of the water were compelled to suspend it, and now 2½ tons per fm.; we hope shortly to resume it again, as the water is increasing in the end. We have opened on the lode intersected in the 90 cross-cut for a short distance; although it presented a good appearance when cut it is poor, consequently we have resumed the driving of the cross-cut to see Cymo's and other lodes. We have communicated the rise referred to from the 60 to the 80, which has laid open the ground, showing the large quantities of ore have been discovered near this cross-cut, and we have decided in putting up a rise from the 104 in the cross-course, to communicate with the 80, and thus prove this piece of ground. The 50, on Vivian's lode, east of Hallett's shaft, will produce full 1 ton per fm., with a good appearance. The 38, on Menadue's lode, is poor, but very promising. The 17 west, on the same lode, is also poor. The 17, west of little cross-course, on Pryor's lode, is now producing stones of ore. We are cutting a pit at Pryor's, to enable us to sink below the 30; we have suspended the driving at this point until the pit is cut. We have not intersected any lode in the 17 cross-cut, south of Pryor's, since last report, nor we expect for some little time to come, but the lode is in the end. Another feature presents itself to us, after going into all matters in connection with this mine, in the event of our not making discoveries shortly at Pryor's, to take a portion of the men from that district and sink Hallett's shaft below the 50; in sinking this shaft on Menadue lode we shall intersect Vivian's lode, which is in whole ground in this part of the mine; and seeing what it has produced in the eastern part of the mine, as well as in Craddock Moor, we think there is a great chance at this point, but we cannot afford to do everything at once. In conclusion, we beg to say we are developing this mine as fast and as economically as possible; and seeing the number of men we have on work, we hope and believe improvements will shortly take place. The amount of money spent on unproductive ground and about Pryor's is in all 2000l. per month. We where, as you are aware, glad to give you a good report when we were in a position to do so, which has been borne out by results, and we do not hesitate in giving you a faithful report when we are poor. But our present position is nothing new for this neighbourhood, and by perseverance in opening up the ground good discoveries have been made, and will be accomplished here, in our opinion.—F. PRYOR, W. JOHNS, R. THATHEN.

The CHAIRMAN moved the adoption of the report and accounts, and said it would be recalled that in November and December the loss upon the operations amounted to 627l.; but in the accounts just read, which included the result of the operations during the months of January and February, the loss did not exceed 299l., and the accounts for the following two months showed a loss of 218l.; so that the loss upon the first four months of this year was less than the loss was upon the last two months of the past year, for in the four months the loss had been 546l., while during the two months the loss had amounted to 627l.—that was, so far, satisfactory. He might, perhaps, mention that the committee had been discussing the propriety of presenting accounts two months later, so as to prevent so long an arrear.

The SECRETARY explained that at present the committee always possessed the exact amount of the sales of ore, although the ore bills were not in their hands until a few days after the general meetings. It was proposed at the next meeting to close up the books after the end of June, which could easily be done by postponing that meeting for a few days—then the accounts would be up as close as possible.

A SHAREHOLDER wished to know whether the committee thought it probable that the proposed change would induce the public to imagine that the company was getting into a worse position?

The CHAIRMAN did not apprehend any such result, for although the books were not now so closed, yet the result of the operations was always known to the committee, and stated at the general meetings. The mine now was in the same position, as far as market value was concerned, as when Capt. Pryor first took the management.

Dr. McCRAE enquired if there had of late been any discovery made?

The SECRETARY replied that some stones of ore had been got from the 30, at Pryor's, but they had not yet got a course of ore.

Mr. YOUNG enquired what had been done at that shaft during the past two months?

The SECRETARY replied that at present the shaft was not being sunk, but they were driving from it. It was proposed, unless some discovery was shortly made in that direction, to diminish the force, and resume the sinking of Hallett's shaft below the 50, when they would intersect Vivian's lode. There were cross-cuts going out, and there was otherwise a considerable amount of work on operations going on.

Mr. HADDOCK said the next two months' sale would show a less return, but then the books would be less.—The report and accounts were received and adopted.

The CHAIRMAN said there was no disguising the fact that up to the present time the western ground had disappointed the fair expectations of their manager.

Dr. McCRAE remarked that it seemed to be the characteristic of the mines in the Caradon district to fluctuate in value to a very considerable extent—one day they were rich, the next they were poor, and then they were rich again. It was precisely the same at South Caradon and East Caradon.

The SECRETARY said the character of the Caradon district was to produce bunches of ore which were very rich, but very variable. He thought it was a very prudent suggestion, having regard to the fact that the capital was being incurred for unproductive operations, to divide the cost between Pryor's and Hallett's shafts.

It was agreed that at the next meeting the accounts should be closed up to the end of June. A vote of thanks to the Chairman terminated the proceedings.

EAST WHEEL MARTHA MINING COMPANY.

An extraordinary general meeting of proprietors was held at the company's offices, Crown-court, Threadneedle-street, on Monday, Mr. JAMES WRIGHT in the chair.

Mr. SEARBY (managing director) read the notice convening the meeting. The CHAIRMAN said he became connected with the company but a short time since. When he was about to join the board, his first question was—What is the amount of capital to be expended? He at once saw that the capital was altogether insufficient to carry out the necessary works, and suggested that one of two modes should be adopted to obtain fresh capital. Experience in these things told him that the best plan was to wind-up the company, and form another, giving a preference to the present shareholders. Although it was true there was yet capital to be called up, yet he considered it a sine qua non, before he joined the board, that the works should not be proceeded with until fresh capital was raised, for if the property should be proved to contain the same lodes as the New Wheel Martha, the capital at present would not be sufficient to develop its resources. The plan which he should propose was this, that the present company should be wound-up, and that a new company should be formed to purchase, by means of shares, the property of the old company, such shares to be distributed to the present shareholders upon certain terms. In this company there were 2500 shares upon which calls had been made to the extent of 25s. per share, and 2500 shares upon which calls had been made to the extent of 50s. per share. The main point to be considered was the proportion of interest could be given to the new shares. Some trouble had been taken to ascertain the value of the different classes of shares in the market, and it was found that the extreme value of the shares upon which 50s. had been paid was 25s., and that 15s. per share was the value of those upon which 30s. had been paid, hence the division of the new shares would have to be based upon those proportions. The present 50s. shares were fully paid-up, and therefore not liable to call; but by the proposed arrangement of issuing those shares as 25s. paid-up, the holders would be liable to that extra amount of call, but as an equivalent he proposed to add 5s. per share, and issue them as 30s. paid-up. As regards the 25s. shares, the market value of which was 15s., if they were issued as such there would necessarily be two classes of shares, which was a great drawback to any company. To obviate this, it was suggested to give for every two of such shares one new share, with 30s. paid-up. He would suggest that the new company should have a capital of 22,500l.; so that, after deducting the amount upon the shares partly paid-up, there would be left a working capital of 17,500l. He believed 10,000l. would be ample, but it was not prudent for a limited liability company to work up to its full amount of capital.

Mr. G. SNELL enquired whether it was proposed to wind-up voluntarily?—The CHAIRMAN replied that it was proposed to adopt a purely voluntary winding-up.

Mr. F. SNELL was of opinion that, before any resolution of that sort was agreed upon, a statement of accounts should be sent to each shareholder.

Mr. SEARBY said that a duly audited statement of accounts would be sent to each shareholder before the next meeting, which must be called for the purpose of confirming any resolution that might be come to upon the present occasion.

The CHAIRMAN said there could be no doubt that the best plan to adopt to recover what money had been spent was to wind-up the present company in the simplest manner possible, and then to form a new company.

Mr. SEARBY then read a statement of accounts, from which it appeared there was un-called up capital amounting to 4775l., and calls in arrears to the amount of 589l.

The CHAIRMAN, in answer to Mr. SNELL, stated that the object of keeping a certain number of men at the mine was to enable the company to keep possession of the property. Until the results to be realised from the lode in New Wheel Martha were known, it was not prudent to incur any great further expenditure in East Wheel Martha.

Capt. JENNER said he believed he was the second largest shareholder in the company, and all he could say was that he was perfectly contented with everything that had hitherto been done. It was true the works had not been pushed on so vigorously as they might have been, but there had been an object in view. He could only speak for himself, but he assured the meeting that Mr. Searby had done everything in his power to promote the best interests of the shareholders.

Mr. SEARBY said the fact was, if the mine had been worked at all the company would have been in a bankrupt state long ago.

Mr. G. SNELL had known the property for many years, and he thought there could not be a second opinion as to the lodes of New Wheel Martha running through the East Martha sets.

Mr. SEARBY said all the work that had been done up to the present time would prove of great advantage when the property began to be developed in earnest.

Capt. JENNER said he was quite willing to continue in a new company the large interest he now held, for he felt confident that a vigorous development of the property would bring about successful results.

Mr. BELL (the company's solicitor), in answer to a question, stated that the notice convening the meeting was to the effect that the shareholders were called together to determine what course should be adopted, and in the resolution about to be proposed the shareholders would call upon the directors to take a certain step.

The CHAIRMAN, in answer to a question, stated that his plan would be to recommend the liquidators to wind-up the present company, and to sell the whole of the assets to a new company to be formed, and to offer, upon the terms he had mentioned, to the present shareholders their *pro rata* interest in the new company.

A resolution was then proposed by the CHAIRMAN, to the effect that the company should be wound up voluntarily, which was seconded by Capt. JENNER.

Mr. F. SNELL proposed, as an amendment, that the company be wound-up by the Court of Chancery, which the absence of a second, fell to the ground.—The resolution was put and carried, with one dissentient voice.

Capt. JENNER proposed that Messrs. Wright and Searby be appointed liquidators.

The CHAIRMAN thought it better to have somebody from the body of shareholders.

Mr. F. SNELL did not think it right that the managing director or secretary should be appointed one of the liquidators.

Capt. JENNER said he had confidence in Mr. Searby, and was quite satisfied with the way in which he had conducted his business.

A resolution was proposed by Mr. T. C. SMITH, to the effect that Messrs. Wright, Searby, and Warwick (accountant) should be appointed liquidators.

An amendment was proposed, that Mr. Dunbar (public accountant) should be one of the liquidators. The amendment was lost, when the resolution was put and carried unanimously. A vote of thanks to the Chairman terminated the proceedings.

EAST CARN BREA MINING COMPANY.

A general meeting of shareholders was held at the company's offices, Threadneedle-street, on Tuesday, Mr. FURLONGER in the chair.

The SECRETARY read the notice convening the meeting, and the minutes of the last were read and confirmed. A statement of accounts was submitted, from which the following is condensed—

Balance last audit	£1066 15 2
Advance on tribute	100 0 0
Copper ore sold, March	1682 3 6
Ditto, April	761 15 11
Calls received since last audit	188 16 0 = £3760 10 7
March cost, merchants' bills, &c.	£ 643 13 0
New engine	1793 0 0
April cost, merchants' bills, &c.	574 18 2
Advance on tribute	100 0 0
Sundries	21 6 8 = 3532 17 10
Leaving credit balance	£ 227 12 9

The report of the agent was read, as follows:—

June 22.—The old engine-shaft is down 4 fms. 2 ft. below the 60. In the 60, east of the cross-cut, the middle lode is much improved, and will now produce 3 tons of copper ore per fm. This level is within about 9 fms. of the cross-course; when intersected we intend to drive south on its course to communicate with the new shaft, we shall then turn the water back through the 60, and do away with 80 fms. of lifts in the old engine-shaft.

In the 50, driving east of the cross-course, the south lode is 15 in. wide, yielding stones of ore, but not enough to value. We expect to communicate this level with the new shaft in a few days. The level is driven 30 fms. south of the south lode, in which there is a beautiful mineralised kilian. We cannot say the exact distance there is further to drive to cut the lode seen in the adit level. In the winze sinking below the 50 the lode is yielding 3 tons of ore per fm. The western shaft is down 7 fms. below the 50, in which the lode is 2 ft. wide, yielding 2 tons of ore per fm., with every appearance of a further improvement. In the rise in the back of the 28 the lode will produce 1 ton of ore per fm. We calculate to sample, on Wednesday next, about 350 tons of ore, making for the two months 450 tons. Annexed you have an estimate of the available ore ground standing in the backs of the 60, 50, and 40 fm. levels; in addition to which there are the pitches working in the backs of the 60, 50, and 36 fm. levels, which it is impossible to give a correct estimate of; neither have we made an estimate of the ore ground passed over in the 50 for 120 fms. in length. We feel sanguine that by perseverance, as on previous occasions in laying open ground and intersecting the numerous adit lodes, we shall have a good and lasting mine. We have 118 men working on tubwork and tribute. Estimated value of ore ground in the 60, 50, and 40 fathom levels:—Middle lode, in the back of the 60, 4050l.; south lode, in the back of the 60, 4455l.; back of 50, west of cross-cut, 4500l.; back of 40, east of cross-cut, 4500l.; total, 17,655l.—THOMAS GLANVILLE, JAMES SCHOLAR.

The CHAIRMAN thought it would be generally admitted that the report just read was by no means of an unsatisfactory character, but that, on the contrary, it showed that the mine was in a much more favourable position than it had been for some time past. It was a great relief to hear that there had not been a division of profits, but the fact was a large sum of money had been expended in the purchase of an engine. He was glad to say that engine had been paid for, and that ore was now being raised at a considerably less price than hitherto. In addition to that, as was now being seen by the report there were various improvements in different parts of the mine. Since the last meeting the company had sustained a loss by the death of Mr. R. Lyle, who had been a most efficient servant, but who, unfortunately, was suddenly cut off in the prime of youth. It would be the duty of the present meeting to confirm the appointment of a successor.

Mr. G. BATTERS enquired what amount of profit had been realised during the two months that is putting the mine in a better position?—The CHAIRMAN said that the two months' costs—ordinary costs—against returns, there had been a profit of about 700l.

Mr. LANTON said that the profit could be ascertained by putting the cost of the engine (1790l.) against the balance in hand (1066l.).

Mr. G. BATTERS thought that the great deduction in the cost was a most satisfactory feature, seeing that some people imagined that Capt. Glanville was an expensive agent. The CHAIRMAN said he never heard any complaint against his captain, except when the shares fell, and copper was low; and when the company was in a position to reward him, he (the CHAIRMAN) was sure they would not be slow in rewarding him (Captain Glanville) according to his merits.

Mr. E. COOKE noticed that the report stated there were 118 men employed. He should like to ask what number were employed on tubwork and what number upon tribute?

Mr. LANTON stated that there were 60 employed upon tubwork and 58 upon tribute.

Mr. G. SEYMOUR enquired if the costs had been diminished to any extent?

The CHAIRMAN said the costs had been very considerably reduced, and the returns would, he hoped, be increased.

Mr. G. SEYMOUR was glad to hear that the costs had been diminished, for it was constantly being said that the mine was too expensively worked.

Mr. E. COOKE said it was satisfactory to find that there were about an equal number of men upon tubwork and tribute.

Mr. G. SEYMOUR enquired what prospects there were of a dividend?—The CHAIRMAN said if they came upon a course of ore a dividend would be declared sooner than expected; but, as he had already said, a dividend might have been declared before the present time had they not expended just upon 1800l. for an engine. But now that they had got that engine, and had paid for it, the mine could be much more economically developed, which could not fail to prove of great permanent advantage to each shareholder.

Mr. BATTERS drew attention to the fact that two cross-cuts were being pushed out to one of the lodes.

The CHAIRMAN said it was impossible to conjecture what results would be obtained, or how soon, as the ground was literally full of ore. As far as he was concerned, he was perfectly satisfied with the general prospects of the mine.

Mr. G. SEYMOUR thought there could be no doubt that East Carn Brea was a good mine; but it was not to be expected that they could reap and sow at the same time.

Mr. LANTON, who spoke from a perfect knowledge of the district, was perfectly satisfied that East Carn Brea could not fail to prove itself a good mine.

The CHAIRMAN said it was by no means an unimportant fact to know that the mine could be worked for several years yet, and that the cost of working it was not excessive.

Mr. SEYMOUR thought it was but reasonable to expect that when the mine began to pay dividends it would continue to pay them.

The report and accounts were received and adopted.

The appointment of Mr. G. Lightly, as pay clerk, in the room of Mr. R. Lyle, deceased, was confirmed.—A vote of thanks to the Chairman terminated the proceedings.

NORTH MINERA MINING COMPANY.

A special general meeting of the proprietors was held at the company's offices, Crown-court, Threadneedle-street, on June 19, for the purpose of confirming or otherwise the resolution passed at a previous meeting, authorising the directors to issue 5000l. new shares, at 1l. each, entitled to a preferential dividend of 20 per cent. per annum, and to share equally with the ordinary shares in the remaining profits.—Mr. T. P. THOMAS (managing director) in the chair.

Mr. C. W. W. THOMAS (the secretary) read the notice convening the meeting.

The CHAIRMAN said he had hardly inform the proprietors that the object of the present meeting was to consider the propriety or otherwise of confirming a resolution, which was passed at the last meeting, for the increase of the company's capital. While it was for the shareholders to determine as to whether or not that resolution should be confirmed, it was his duty, occupying the position to which the shareholders had pleased to elect him, to lay before the meeting all the information he possessed in connection with the undertaking, and with that view he, perhaps, could not do better than to read the annexed report:—

June 18.—For the past month the ground in the eastern shaft had been very hard and troublesome to blast, but such progress had been made as the ground would allow. As the lode had come in, the ground and the lode have become a little easier. The lode is looking very favourable for ore, and will produce about 1 ton per fm. In the winze sinking below the 45 yard level, west of shaft, the lode appears to be heaved north, as by driving in north we have found the wall, against which there is a very kindly ground, containing good stones of solid ore. The slope in back of the 15 fm. level, which is being worked on tribute by four men, at 7l. per ton of lead, is looking well, and will produce 1½ ton per fm. We have dispensed with the carpenter, engineer, and foreman driver, and until we get our shaft and winze down 20 fms. deeper we shall keep the cost as low as possible, and confine our operations to sinking, with the exception of the tribute pitch. We are dressing our ore as fast as it is broken, and have now in the ore house dressed about 5 tons.

He might mention that Minera, the richest mine in Wales, was nothing like so rich as North Minera at the depth.

Mr. E. COOKE enquired if the Chairman had ever heard whether the workings at Minera, when at the present depth of North Minera, were in such unsettled ground?

The CHAIRMAN said that all through the winze the veins were very uncertain; it was not till about the 60 yard level was reached that the yield of ore was steady.

Mr. E. COOKE enquired the deepest part of Minera?—The CHAIRMAN replied that Minera had been developed to 120 yards, and that the deepest point in North Minera was about 50 yards. The lode referred to in the report was that from which so much ore had been raised. He did not think it would be prudent for the shaft to follow one vein, seeing that there were so many other veins which might be intersected if the shaft were continued perpendicularly.

Mr. E. COOKE said a friend some few days since had written to him to obtain an inspecting order. The order was sent, and Capt. Lenn, of the Trelogan Mine, was engaged to report on the property, and the following letter was sent to him (Mr. Cooke):—

June 17.—Yesterday I inspected North Minera; although the mine, at present, is poor, I have no doubt of future success. The geological features are good, especially the south east part of the set, which borders on the coal measures, and on the junction of these two channels of ground, where lodes have been proved, scarcely ever failed making abundance of lead; the district, also, is good, being situated near the Great Minera Mine, which makes a profit of £5,000l. a-year. But you must get deeper, as there is so much confusion and uncertainty at and near these shallow workings. To warrant a deeper search, there is now a good branch of lead in the bottom of the engine-shaft; this of itself is quite sufficient to justify the suggestion. The lodes at the shallow points are likewise split up in branches; the probability is that these branches and strings will unite in depth. There are also intersecting courses, called canyons, from which good results may be expected. To develop the mine thoroughly is a work of time, as the ground is hard, but the water charges are, at present, not worth mentioning, therefore you have some advantage. I heartily wish you success.—J. LENN.

Although he knew nothing whatever about the agent that was to be engaged to inspect the set, yet it was satisfactory to him to find the favourable opinion that had always been expressed with respect to this property thus confirmed. He thought there could be no question of the capital and a vigorous development were the only desiderata to make North Minera a productive mine.

Mr. W. LELAND enquired the number of fathoms before another level was commenced?

The CHAIRMAN replied about 3 fms., which, he estimated, would be sunk in the course of the next month.

Mr. MILFORD, referring to the raising of additional capital, said that at the last meeting that question was fully discussed; and, from the corroborative statement just adduced, he (Mr. Milford) thought there could hardly be two opinions upon the desirability of confirming the resolution which was unanimously passed at the previous meeting.

Mr. W. LELAND, who represented a considerable interest, said he entirely approved of the resolution.

After some further discussion, the resolution to the following effect was read:—“That the directors be authorised to issue 5000 new shares, at 1l. each, entitled to a preferential dividend of 20 per cent. per annum, and also entitled to share equally with the ordinary shares in the remaining profits, such preferential shares to be offered *pro rata* to the present shareholders, and those not applied for and paid upon by a day to be appointed by the directors, to be placed in the hands of the directors, to be disposed of for the benefit of the company.” And it was resolved:—“That the same be and is hereby confirmed.” A vote of thanks to the Chairman terminated the proceedings.

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